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EPA Region 5 Records Ctr.

SITE ASSESSMENT REPORT
FOR
LINDSAY LIGHT COMPANY SITE
U.S. EPA ID: N/A

SSID#: N/A TDD: T05-9305-014 PAN: EIL0794SAA

August 2, 1993

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1.0 SITE DESCRIPTION

The Lindsay Light Company Building is a four story commercial building located at 161 E. Grand, at the corner of Grand Avenue and St. Clair Street, in Downtown Chicago, Illinois. Grand Avenue is about one-half mile north of the central Chicago "Loop" area. The geographical location is 41° 53' 30" north latitude and 88° 36' 30" west longitude (See Figure 1 for site location). The site is currently being occupied several companies including audio/video production companies called Optimus and Streeterville Studio, Inc..

2.0 SITE HISTORY

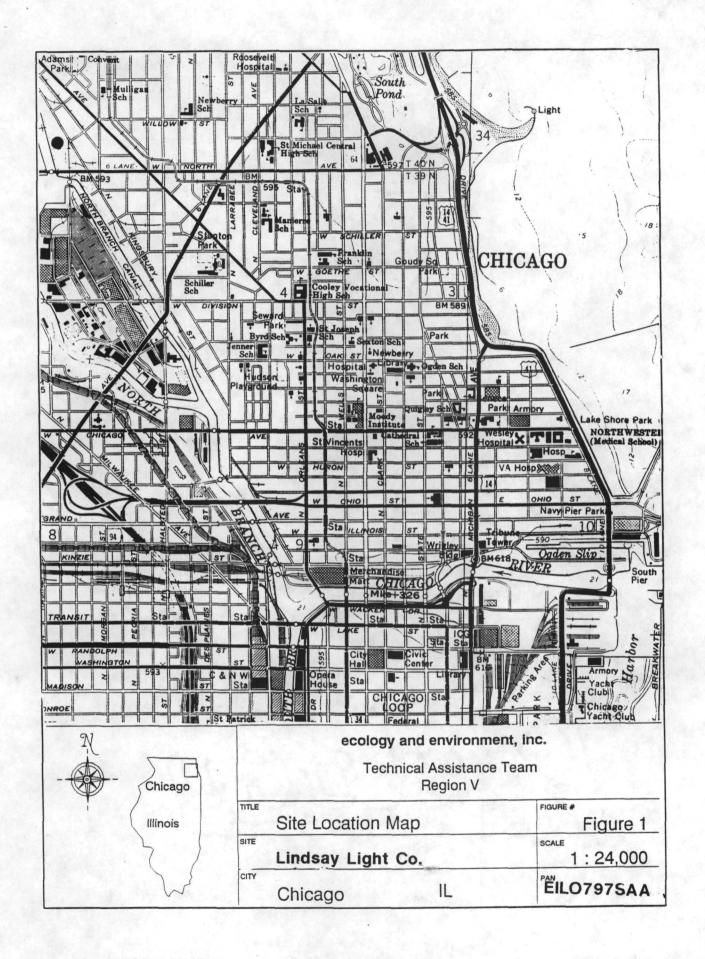
The Lindsay Light Company manufactured incandescent gas mantles for home and street lighting in this building from at least 1910 until 1936. Lindsay Light moved to West Chicago and was later purchased by American Potash, which was later purchased by Kerr McGee Chemical Company in 1967. The principal ingredient in gas mantle manufacture are the gauze mantle bags which were dipped into thorium nitrate solution. Small amounts of cerium, beryllium and magnesium nitrates were also used. The present owners of the building, Browne and Storch, a real estate firm, purchased the building in 1978.

In August of 1981, The building owners attempted to decontaminate part of the second and fourth floor. The building owners hired Radiation Safety Services (RSSI) to determine the contaminated areas. RSSI identified areas of gamma dose rate at one meter above the floor in the building. Any readings above 100 micro-Roentgen per hour at one meter above the floor were candidates for decontamination. The building owners supplied the laborers and tools to assist RSSI in decontamining the second and fourth floor.

After the area of oak floor was determined to be contaminated, the floor was removed. All subflooring found to be contaminated was either removed or chiseled down a half inch. The decontamination was only performed on occupied work areas.

During June of 1983, as part of the U.S. EPA survey, 7 film badges were placed at specific locations of concern to collect dose measurements. The range of the 25 day gross dose equivalent ranged from minimal (5 badges) to 20 millirem (2 badges).

In February 1984, The building owners began reconstruction on the second floor. Prior to performing the reconstructioning project, RSSI conducted one hour training on radiation and collected wipe samples at the areas of concern. RSSI surveyed the area while the removal of the contaminated material was being conducted.



3.0 SITE ASSESSMENT

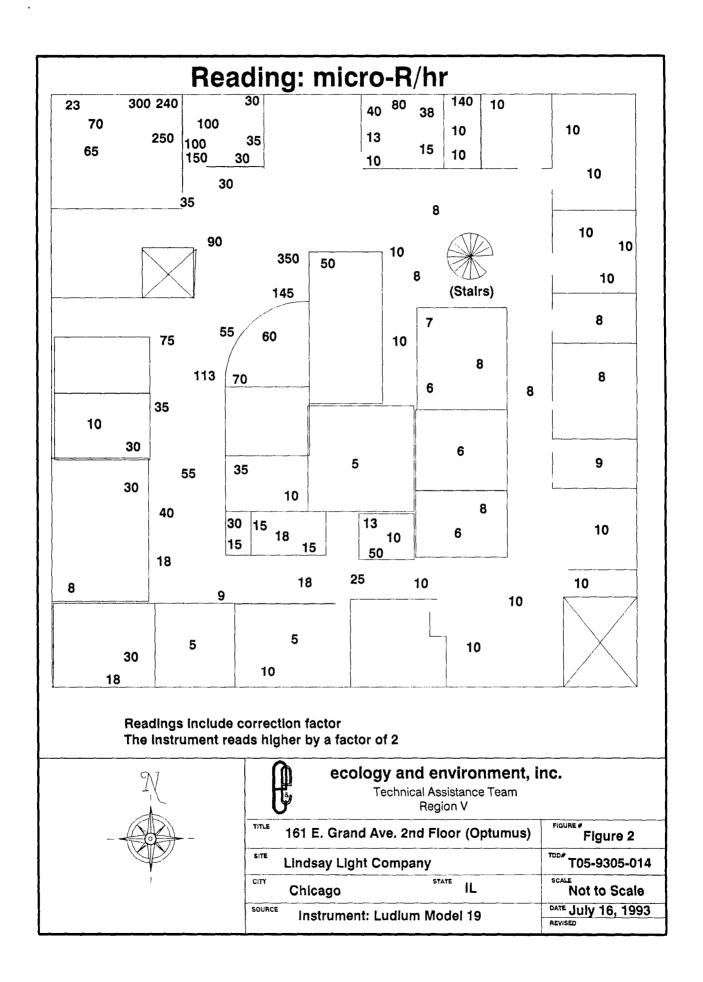
At 1700 hours, on June 2, 1993, U.S. EPA On-Scene Coordinator (OSC) Verneta Simon, U.S. EPA Emergency Response Team (ERT) Art Ball, U.S. EPA Air and Radiation Division (ARD) personnel Larry Jensen, Betsy Karr, and Michael Murphy, Illinois Department of Nuclear Safety (IDNS) representatives Tim Runyon and Vince Muzzalupo, and Technical Assistance Team (TAT) member Ron Bugg met with the building manager Ron Steele of 161 E. Grand Associates to perform a site assessment using gamma survey meters. The meters used were Micro-R meters, Ludlum Model 19 (measuring in micro-Roentgens per hour), radiation count rate meter with a sodium iodide (NaI) probe (measuring in counts per minute (cpm)) and a radiation count rate meter with an alpha probe (cpm). The four floor building, plus a basement was divided into floors to conduct a survey readings throughout each floor.

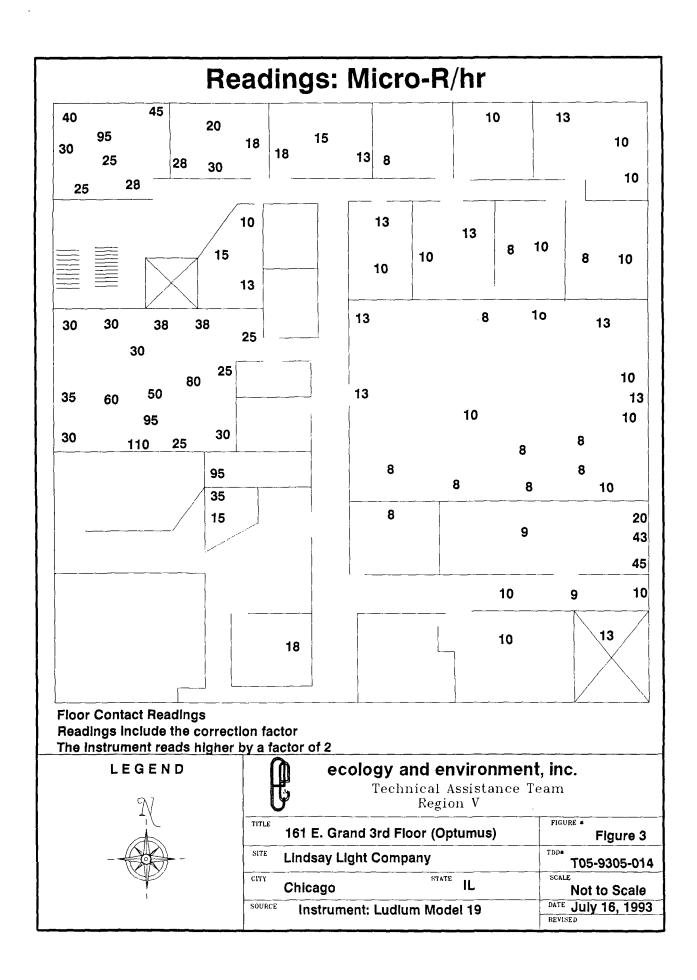
At 1745 hours, the group began to perform monitoring of the third floor with the micro-R meter and radiation monitors using a NaI Due to the Ludlum Model 19 crystal over response to thorium, the levels were compensated by dividing the readings by a factor of 2. The correction factor was determined by comparing the results to other comparable instruments. All readings are gross exposure, no background subtraction, and are measured at contact. The background for the area was determined to be 6 micro-R/hr for naturally occurring radiation. The micro-R meter reading of the northwest corner office was as high as 95 micro-R/hr and 110 in a studio area near the west side of the building (See Figure 3 for third floor results). During the surveying of the third floor, The main party split up into two groups. OSC Simon, ERT Ball, IDNS Muzzalupo, and TAT Bugg (group 1) prepared for surveying the fourth floor. The remaining individuals (group 2) continued to survey the third floor.

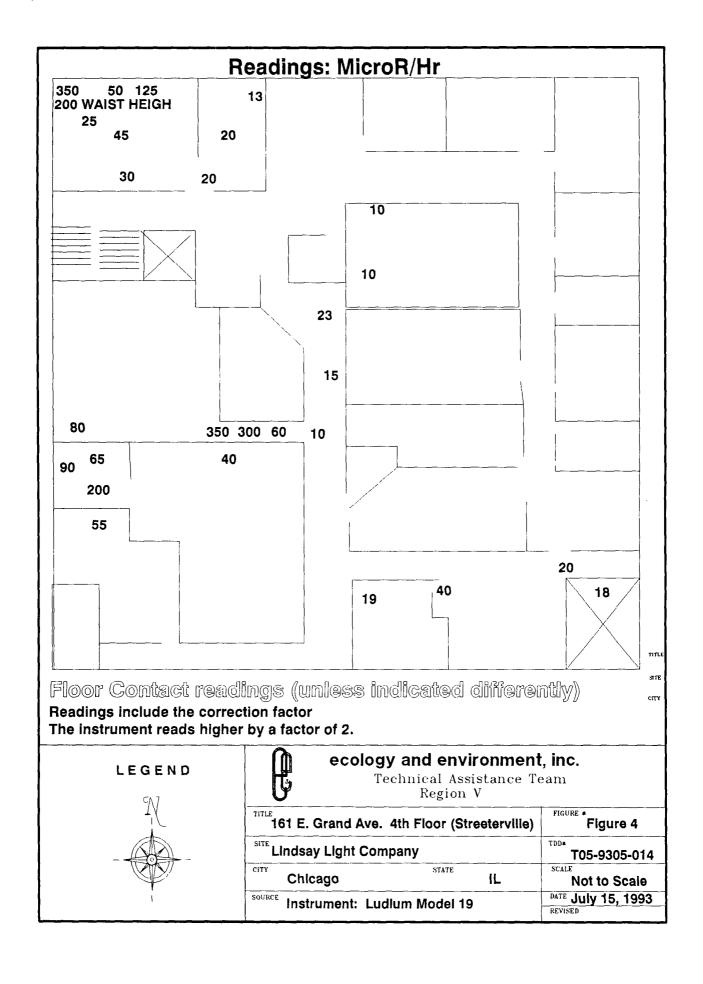
At 1830 hours, group 1 began surveying the fourth floor. Group 1 could only perform a partial survey on the fourth floor due to the recording session in the booth located on the east section of the floor. The area where work was performed by the building owners contractor in 1987 to remove an area of contaminated material, had a reading of 350 micro-R/hr at floor contact and 200 microR/hr waist high (See Figure 4 for fourth floor results).

At 1900 hours, Group 2 conducted the survey on the second floor. The northwest corner office had high readings of up to 300 micro-R/hr. A window of the east adjacent room from the corner office had readings of 80 micro-R/hr (See Figure 2 for second floor results).

At 1920 hours, group 1 began to survey the first floor. Ron Steele requested the survey be performed away from the northeast section of the floor due to a client presentation that was taking place in that area. Group 1 began to survey the front lobby and the







secretary area in the northwest corner of the floor. The reading near the secretary was 100 micro-R/hr. The lobby area ranged from 30 to 75 micro/hr (See Figure 5 for first floor results).

At 2000 hours, group 1 began to survey the basement area. The area of concern in the basement with the highest gross exposure rate was measured on contact with a concrete plug in the chimney. The micro-R survey indicated level of 2,250 micro-R/hr at contact of the chimney and 250 micro-R/hr at one meter away from the chimney (See Figure 6 for basement results).

At 2015 hours, group 2 completed the second floor survey and assisted group 1's survey of the basement. Near the central area of the basement where records were kept in storage, the micro-R read 20 to 100 uR/hr. Readings of 18 to 20 micro-R/hr were found near the freight elevator. Group 1 also surveyed the stairs leading into the building area (See Figure 5 for result).

At 2040 hours, the OSC, ERT member, ARD representatives, IDNS representatives, and TAT went over the results with the building spokesman Ron Steele. It was suggested that due to the high readings from the chimney, the janitor's supplies near the chimney should be immediately relocated. After the meeting the groups left the site at 2100 hours.

On June 30, 1993, 12 thermoluminescent dosimeter (TLD) badges were placed near occuppied work areas throughout the four story building for one month.

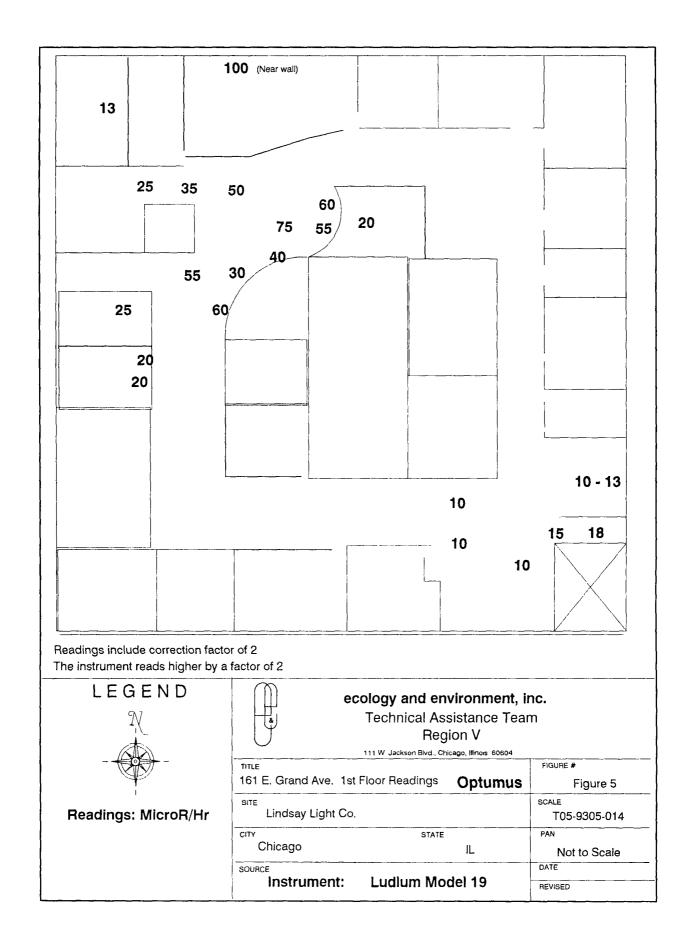
4.0 ANALYTICAL RESULTS

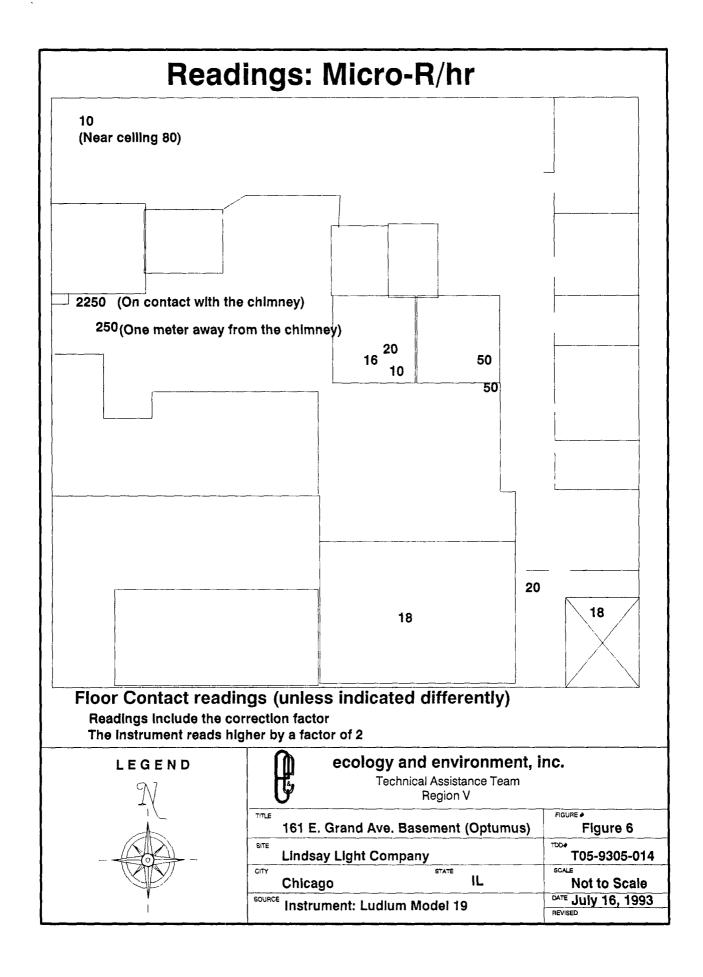
The results of the survey revealed the presence of radioactive material in flooring and chimney which potentially contains contaminated waste ash. Earlier work performed by the building owner's contractor determined that the thorium materials appeared to have been absorbed into porous flooring material and possibly spread due to flood caused by a leaking roof. The analytical results were not available for the wipe sample and the TLD badges.

5.0 DISCUSSION OF POTENTIAL THREATS

The conditions at the former Lindsay Light site at 161 E. Grand, Chicago, Illinois that may warrant a removal action, as set forth in paragraph (b) (2) of Section 300.415 of the National Contingency Plan (NCP), included:

Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances or pollutants or contaminants: The site investigation with micro-R meter indicated substantially elevated levels of radioactivity in several areas throughout the





building. Gamma-ray emissions from the radioactive thorium decay series producing potential human exposures will continue as long as contaminants remain in the building. Continual gamma-ray exposure increases the risk for cancer due to ionizing radiation. Thorium dust may cause an increase chance of developing cancer of the lung decades after being exposed. Ingestion of thorium can increase the risk of liver cancer. Thorium radiactively decays to radon-220 and then to its decay products. Radon-220 decay products con increase thr risk of lung cancer.

Other situations or factors that may pose threats to public health or welfare or the environment.

Due to the contaminant of concern, one may be exposed to radioactive isotopes and the effects may occur many years after exposure. Thorium occurs principally as the parent radionuclide thorium-232 in association with its daughter products in a decay sequence known as the Thorium Decay Series. Thorium-232 has a half-life of 14 billion years. Several daughter products of concern are Radon-220 and Radon-222 (See Table 1 for Thorium Decay Series).

6.0 CONCLUSION

After conducting the survey at 161 E. Grand Street, formerly Lindsay Light Company site, had readings 400 times greater than background. High exposure rates were found in work areas and near the chimney in the basement. The latter indicated radioactive material inside the chimney. The isotope of concern is believed to be thorium. To determine the level of radiation, TLD badges were placed near the work areas that had high micro-R meter readings.

APPENDIX A SITE PHOTOGRAPHS

SITE NAME: Lindsay Light Company

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U.S.EPA ID:

TDD: T05-9305-014 PAN:EIL0794SAA

DATE: 6/2/93

TIME: 2030

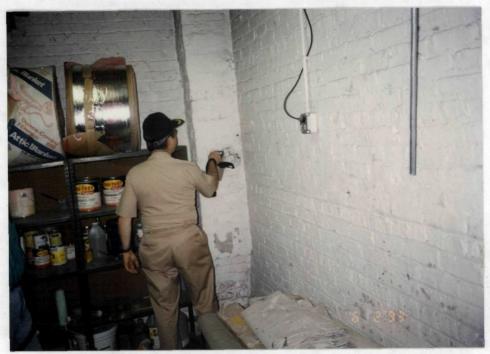
DIRECTION OF PHOTOGRAPH:

West

WEATHER CONDITIONS: N/A

PHOTGORAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: Reading at contact of the chimney (2250 uR/hr). The

chimney is located near the northwest section of the basement.

DATE: 6/2/93

TIME: 2030

DIRECTION OF PHOTOGRAPH: Northwest

WEATHER CONDITIONS: N/A

PHOTOGRAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: The janitors area located near the chimney. One meter away from the chimney the readings were reduced by a factor of 10.

SITE NAME: Lindsay Light Company

PAGE 2 OF 5

U.S.EPA ID:

TDD: T05-9305-014 PAN:EIL0794SAA

DATE: 6/2/93

TIME: 1930

DIRECTION OF PHOTOGRAPH:

East

WEATHER CONDITIONS: N/A

PHOTGORAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: Reading at contact near the receptionist area

(receptionist is to the north (left of the photo).

DATE: 6/2/93

TIME: 2000

DIRECTION OF PHOTOGRAPH: North

WEATHER CONDITIONS:

N/A

PHOTOGRAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: The Second floor photo of the area where the window

area had a reading of 80 uR/hr.

SITE NAME: Lindsay Light Company

PAGE 3 OF 5

U.S.EPA ID:

TDD: T05-9305-014 PAN:EIL0794SAA

DATE: 6/2/93

TIME: 1745

DIRECTION OF PHOTOGRAPH: North

WEATHER CONDITIONS: N/A

PHOTGORAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: Reading at contact near the northeast corner of the

third floor.

DATE: 6/2/93

TIME: 1830

DIRECTION OF PHOTOGRAPH: North

WEATHER CONDITIONS: N/A

PHOTOGRAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: The third floor sound booth that had readings of 95 uR/hr on contact with the floor. The sound booth is located near the southwest side of the third floor.

SITE NAME: Lindsay Light Company

PAGE 4 OF 5

U.S.EPA ID:

TDD: T05-9305-014 PAN:EIL0794SAA

DATE: 6/2/93

TIME: 1745

DIRECTION OF PHOTOGRAPH:

North

WEATHER CONDITIONS:

N/A

PHOTGORAPHED BY:

Ron Bugg

SAMPLE ID (if applicable):

DESCRIPTION: Reading at contact near the northwest corner of the second floor at the east wall of the office. Readings were 250 uR/hr.

DATE: 6/2/93

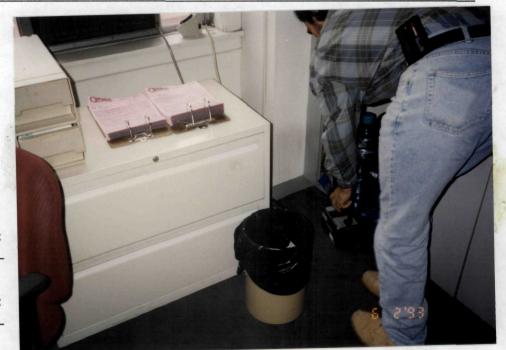
TIME: 1830

DIRECTION OF PHOTOGRAPH: North

WEATHER CONDITIONS: N/A

PHOTOGRAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: The third floor northeast office on contact with the

east wall. Readings were 10 uR/hr.

SITE NAME: Lindsay Light Company

PAGE 5 OF 5

U.S.EPA ID:

TDD: T05-9305-014

PAN: EIL0794SAA

DATE: 6/2/93

TIME: _1845

DIRECTION OF PHOTOGRAPH:

North

WEATHER
CONDITIONS:
N/A

PHOTGORAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: The reading was collected inside a sound booth located on the fourth floor and is near the southwest section of the floor.

The reading was 200 uR/hr.

DATE: 6/2/93

TIME: 1845

DIRECTION OF PHOTOGRAPH:

West

WEATHER CONDITIONS: N/A

PHOTOGRAPHED BY: Ron Bugg

SAMPLE ID (if applicable):



DESCRIPTION: A hallway leading into a sound booth located on the fourth floor. The reading at that point was 350 uR/hr.

APPENDIX B THORIUM DECAY SERIES

Nucl ide	Historical	Half-life	Major radiation energies (MeV) And intensities?			
	name		a	В	Y	
*32Th	Thorium	1.41×10 ¹⁰ y	3.95 (24%) 4.01 (76%)			
***Ra	Mesothorium I	6.7 y		0.055 (100%)		
233 Ac	Mesothorium II	6.13h		1.18 (35%) 1.75 (12%) 2.09 (12%)	0.34c‡ (15%) 0.908 (25%) 0.96c (20%)	
agoth	Radiothorium	1.910v	5.34 (28%) 5.43 (71%)		0.084 (1.5%) 0.214 (0.3%)	
334Ra	Thorium X	3.64d	5.45 (6%) 5.68 (94%)		0.241 (3.7%)	
aac Rn	Emanation Thoron (Tn)	55 s	6.29 (100%)		0.55 (0.07%)	
*15Po	Thorium A	0.155	6.78 (100%)			
alapb	Thorium 8	10.64h	•••	0.346 (81%) 0.586 (14%)	0.239 (47%) 0.300 (3.2%)	
64.0% 36.0%	Thorium C	60.6m	6.05 (25%) 6.09 (10%)	1.55 (5%) 2.26 (55%)	0.040 (2%) / 0.727 (7%) 1.620 (1.8%)	
21 2 Po	Thorium C' la	304ns	8.78 (100%)			
****T1	Thorium C"	3.10m	•••	1.28 (25%) 1.52 (21%) 1.80 (50%)	0.511 (23%) 0.583 (18%%) 0.860 (12%)	
30 bP	Thorium D	Stable		•••	2.614 (106%)	

FIGURE 1: Thorium Decay Series

(Source: Radiological Health Handbook, U.S. Department of Health, Educa

and Welfare, Revised January 1970)

This expression describes the mass number of any member in this series, where s is an integer.

Example: *33 th (4n)......4(58) = 212
*Intensities refer to percentage of disintegrations of the nuclide itself, not to original parent of series.
*Complex energy peak which would be incompletely resolved by instruments of moderately low resolving power such as scintillators.

Data caken from: Lederer, C. M., Hollander, J. M., and Perlman, I., <u>Table of Isotopes</u> (6th ed.; New York: John Wiley 6 Sons. Inc., 1967) and Hogan, O. H., Zigdan, P. E., and Mackin, J. L., <u>Beta Spectra</u> (USNRDL-TR-802 [Washington, D.C.: U.S. Atomic Energy Commission, 1964]).